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A NEW SPECIES OF FRESH-WATER AMPHIPOD OF THE GENUS SYNPLEONIA, WITH REMARKS ON RELATED GENERA.[1]

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In May, 1932, Mr. Andrew Pizzini brought to the United States National Museum a collection of amphipods which he had taken from a spring a short distance west of Georgetown, D. C. One of the specimens, a mature male, possessed a combination of characters not agreeing with those of any of the established genera of fresh-water amphipoda, and was, therefore, recognized as a new genus and species. In 1934 Dr. Edwin P. Creaser established the genus *Synpleonia* for specimens which he had received from Franklin County, Kansas, and, as the present species agrees in all essential characters with his genus, I now designate it as *Synpleonia pizzinii*. Since the discovery of this species in 1932, fine specimens have been taken at a number of localities in the District of Columbia and near-by Maryland and Virginia. Mr. John W. Price, of Lancaster, Pennsylvania, has from time to time taken very large mature specimens of this species in Refton Cave and in the outcrop of subterranean waters in Lancaster County, Pennsylvania. Mr. K. Dearolf has also taken it in Pennsylvania at Refton Cave, Lancaster County; Johnson (upper) Cave, Center County; and Barton Cave and Dulany Cave, Fayette County.

Synpleonia pizzinii, new species.

Diagnosis.—First antenna not greatly longer than second. First gnathopod very much stronger and stouter than second. The fifth peraeopod of the male with second joint very long and narrow, and produced distally into a very prominent anterior downward-projecting lobe which is separated from the posterior lobe by a deep narrow oblique sinus.

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Description.—Female. Head with lateral lobes produced, rounding and prominent; blind. Antenna 1, first peduncular joint about as long as second and third combined; flagellum composed of about twenty-six joints; accessory flagellum very short, two-jointed. Antenna 2, fourth and fifth peduncular joints about equal in length; flagellum shorter than peduncle and consisting of about fourteen joints. Right mandible with molar conical, prominent, and bearing a long seta on inner margin; seven spines in spine-row; accessory cutting plate prominent; palp with third joint longer than second. Maxilla 1, inner plate with five plumose setae; outer plate with seven barbed spine-teeth; palp with second joint much longer than first, and the rounding apex bearing many slender spines. Maxilla 2, outer plate much narrower than inner and distally spinose; inner plate bearing many spines distally and an oblique row of six plumose spines near inner margin. Maxillipeds, inner plate longer and wider than outer and armed distally with three teeth and about six plumose setae; outer plate not reaching end of first joint of palp and bearing distal and inner marginal spines; palp well developed, second joint larger than the others.

Coxal plates 1 to 4 deeper than their segments, lower margins convex and furnished with short setules; fourth slightly excavate behind. Gnathopod 1 much stouter and stronger than 2; second joint shorter than sixth; fifth joint narrowly produced between fourth and sixth; sixth joint widest proximally and converging gradually toward the dactyl hinge, hind margin very short and bearing several groups of setae, palm very oblique, slightly convex, and passing imperceptibly into the short hind margin, armed throughout with a row of short, blunt, notched spines on the outside and a similar row on the inside, defined by two stout spines beyond which is a row of shorter spines; dactyl stout, fitting palm and reaching to the stout defining spines. Gnathopod 2 slenderer than 1 but equalling it in length, second joint about equal in length to the third, fourth and fifth combined, fifth nearly as long as sixth with lower margin broadly convex and bearing groups of long setae; sixth joint widest distally, hind margin bearing groups of long setae, palm slightly oblique, slightly convex, and passing into the hind margin by an evenly rounding and somewhat protruding curve, armed on the outside and inside with short, blunt, notched spines as in gnathopod 1, defined by a stout spine beyond which is a row of shorter spines; dactyl fitting palm, the apex resting against the row of short spines on the rounding corner of the joint.

Peraeopods 1 and 2 similar in size and shape, dactyls rather short and bearing a comparatively long nail. Peraeopods 3 to 5 increasing consecutively in length, second joints with hind margin broadly expanded and forming a shallow distal lobe, dactyls short and bearing short nail.

Pleon segments 1 to 3 with lower margins broadly rounding and without lower hind angles, lower margins and lower hind margins armed with short spinules. The three ural segments coalesced. Although the division between the first and second segments in many specimens is still quite visible, in others it has completely disappeared.

Uropod 1 the longest and extending back farther than 2 or 3, outer ramus slightly shorter than inner. Uropod 2, peduncle about equal in length to

the inner ramus which is considerably longer than the outer. Uropod 3 very short, scarcely reaching to the middle of the telson, the single, one-jointed ramus about half the length of the peduncle. Telson about twice as long as wide, armed laterally usually with two or three groups of spines, but in some specimens lateral spines are absent, apex slightly angular or slightly convex and bearing six or seven spines on either side of the center. Length of the largest females about 16 mm.

Male.—The younger males are very much like the females in appearance, but larger or older males differ in several characters. The palm of the first gnathopod is not evenly convex, but has a rounding protuberance near the dactyl hinge bearing several short spines, then a shallow depression followed by a low protuberance which passes imperceptibly into the remaining palm. The palm of gnathopod 2 appears to be more oblique than in the female. In peraeopod 5 the second joint is proportionately much longer and narrower, being about two-thirds as long as all the following joints together, whereas in the female this joint is not one-half the length of the following joints combined. The second joint of peraeopod 5 is produced distally into a very prominent rounding anterior lobe which reaches far below the third joint, the posterior margin of this joint is produced into a shallow lobe which is separated from the anterior lobe by a narrow oblique sinus.

The peduncle of uropod 1 is produced distally into a narrow triangular lobe which rests against the inside surface of the outer ramus. The telson is longer proportionally than in the female with the apex more convex; lateral margin bearing several groups of spines. Length of the largest males about 21 mm.

The gill arrangement of this species is quite complex. J. G. Mackin (1935, p. 46) has already mentioned and figured the bifurcate sternal gills of the sixth and seventh thoracic segments of *Synpleonia americana* (*Boruta americana*). These bifurcate sternal gills were not mentioned by Creaser in his description of the genus *Synpleonia*, but they are present on the sixth and seventh thoracic segments of the male paratype in the U. S. National Museum. Sternal gills of this type were described by Dr. A. Schellenberg (1930, p. 86) who demonstrated that they do not arise from the coxal plates, but from the ventral surface of the segments as do also the median sternal gills. In the genus *Synpleonia* these lateral sternal gills arise from the anterior margin of the segment near the lateral margin and at a considerable distance in front of the coxal gills. In the younger males and females of *S. pizzinii* single simple cylindrical median sternal gills arise from the center of the second, third, and fourth thoracic segments, and in the female a pair of similar, but longer, simple cylindrical sternal gills arise from the first pleon segment in front of the pleopods. In the fully grown males and females the median sternal gills are apparently confined to the second thoracic segment, and in the males of all sizes the sternal gills of the first pleon segment are absent. The coxal gills are biarticulate, as shown by Mackin (1935, Pl. X, fig. 13) for *Synpleonia americana*.

Type.—Mature male taken by Mr. Andrew Pizzini at Wetzel's spring, about one-half mile west of Georgetown, D. C., March 6, 1932. U. S. N. M. no. 76116.

Crangonyx tenuis Smith is undoubtedly a *Synpleonia*. Kunkel (1918, p. 95, fig. 21) states that the last two abdominal segments are fused and figures them so, but I believe he was misled by the depression dividing the first and second ural segments into the supposition that they were articulated. However, further study of mature specimens from the type locality is necessary in order to determine the correct status of this species. *Crangonyx alabamensis* Stout is also a *Synpleonia*, but this species was founded on what were probably immature specimens measuring only 5 to 7 mm., and the description and figures are inadequate for the correct placing of this species.

I have examined the paratypes of *Stygonectes flagellatus* (Benedict) and find that the only generic difference between *Synpleonia* and *Stygonectes* lies in the sternal gills. In *Synpleonia* the lateral sternal gills of the sixth and seventh thoracic segments are bifurcate, while in *Stygonectes* they are simple elongate oval sacks. Lateral sternal gills are present on the first pleon segment of the female in *Stygonectes flagellatus*, and median sternal gills are present on some of the anterior thoracic segments, but owing to the state of preservation of the specimens their exact arrangement could not be ascertained.

Benedict in his description of *Crangonyx flagellatus* (1896, p. 616) did not mention the coalescence of the three ural segments, while W. P. Hay in his creation of the genus *Stygonectes* to receive *Crangonyx flagellatus* (1902, p. 430) states that the last two segments of the urosome are coalesced. He, however, was misled by the shallow depression between the first and second ural segments which he thought to be an articulation. As with *Synpleonia*, this depression in some specimens has very much the appearance of an articulation, while in others it is scarcely perceptible. Ada L. Weckel (1907, p. 53) follows Hay in stating that the last two segments of the urosome of *Stygonectes flagellatus* are coalesced. She also states that the third uropod has a rudimentary inner ramus, but I have examined the paratypes of *Stygonectes flagellatus* and find that the third uropods have no inner ramus.

As was pointed out by Weckel (1907, p. 53), the single specimen of *Crangonyx bowersii* described by C. J. Ulrich (1902, p. 85) was in all probability a female of *Stygonectes flagellatus*. The specimen came from the same artesian well at San Marcos, Texas, from which the type specimens of *Stygonectes flagellatus* were procured, and I can find nothing in the description or figures to distinguish it from that species. He speaks of a rudimentary inner branch to the third uropod and figures the segments of the urosome as articulated, but I believe these observations to be erroneous.

There are four fresh-water genera whose three ural segments are coalesced: *Synurella*, occurring in Europe, Asia, and North America; *Stygonectes*, occurring in North America; *Austroniphargus* (=*Niphargopsis* Monod, 1925, not *Niphargopsis* Chevreux, 1922), occurring in Madagascar; and *Synpleonia*, occurring in North America. The genus *Boruta* is now considered a synonym of *Synurella*. Spandl (1924, p. 460) regards *Boruta tenebrarum* as nothing more than a blind *Synurella*. Borutzky (1927, p. 65) says, "*Boruta tenebrarum*, found by Wrzesniowski in a well at Zakopane in

the Tatras in 1890, a blind form, presents some unimportant differences from *Synurella ambulans*, which points to the close relationship of both forms. It may well be that *Boruta tenebrarum* directly originates from *Synurella ambulans*, which form found unusual conditions in a well and lost the pigment of the eyes. The endemism of *Boruta tenebrarum* (found only once) and the pronounced tendency in *Synurella ambulans* toward a reduction of the eyes, formed only of several ommatidia, all speak in favor of this supposition." Karaman (1931, pp. 28–29) says that the genus *Boruta* is to be eliminated and *Boruta tenebrarum* is to be retained as a *Synurella* standing close to *Synurella jugoslavica subterranea*.

Stygonectes and *Synpleonia* are very closely related, differing only in the form of the sternal gills, and both genera differ from *Synurella* by the complete absence of eyes and by having the telson simple and not partially cleft as it is in *Synurella*. They differ from *Austroniphargus* by having a single one-jointed ramus to the third uropod, and by the simple undivided telson. In *Austroniphargus* the third uropod has a two-jointed outer ramus and a small inner ramus, and the telson is partly cleft.

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